

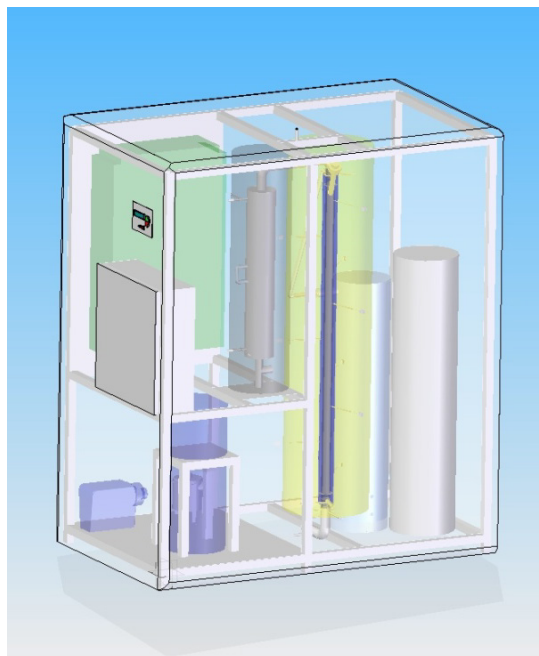
Technology ready for use

Pure Hydrogen from Natural gas and Biogas

- Electrochemical, catalytic process
- High grade hydrogen from raw biogas
- Scalable from 10 to 1 000 Nm³/h
- Container design for rapid installation
- High energy efficiency

The Metacon HyBio 10 hydrogen production system represents the future generation of compact, quiet, clean and efficient energy systems for local, industrial and domestic use and for 350 – 700 bar hydrogen for fueling stations for vehicles

Metacon offers a series of hydrogen production systems based on unique reformers for conversion of biogas and natural gas to hydrogen. Biogas is available in large quantities from anaerobic digestion processes at farms, sewage plants, municipal solid waste facilities and factories. The Metacon energy systems enable cost effective local hydrogen production from renewable energy sources, for direct use or for further conversion to high pressure car fuel or to Combined Heat and Power (CHP) by the addition of fuel cells. Metacon energy systems are designed for continuous operation, long service intervals and zero environmental impact. By efficient conversion of the greenhouse gas methane to clean hydrogen, heat and power, Metacon helps save the climate and reduce the waste and environmental problems in our world.



Operation principles

Hydrogen extraction from hydrocarbons is based on catalytic steam reforming of the hydrocarbon in a catalytic reactor the so-called 'reformer'. The biogas source needs to be purified from possible contaminants like sulfur based compounds etc, that could damage the reformer. For this purpose a source gas purification unit is installed at the input of the plant. The source biogas is used both for the heat generation required by the process and as primary fuel to be reformed.

The reformer reactor is filled with a catalyst, which facilitate the steam reforming reaction. The compounds resulting from this first reaction are primarily H₂, CO and CO₂. The CO content of the gas stream exiting the reformer is reduced with a water gas shift reaction in the HT WGS reactor which combines the gas stream with the steam generated using the exhaust heat of the reformer. The resulting H₂ enriched gas is cooled in order to remove water moisture before the final PSA stage, which deliver the gas at the requested purity.

Converting biogas or natural gas into hydrogen

A clean stream of biogas or natural gas is mixed with water and fed to the reforming reactor to produce hydrogen. Since a large portion of the hydrogen comes from water, water acts as a fuel in this process. Our combination of patented reactor design and catalysts gives a unique so called Heat Integrated Wall Reactors (HIWAR) which functions simultaneously as highly efficient reactors and heat exchangers. The heat required for the process is produced by catalytic combustion of a fraction of the fuel, eliminating open flames and increasing process safety. Additional hydrogen is produced by the Water-Gas- Shift (WGS) reaction which eliminates most of the CO by reacting it with water.

Efficient automatic and remote control

The Metacon Hydrogen Production System is highly automated with PCB based state of the art control systems and can operate autonomously and unattended. Remote monitoring and control can be specified. The smart control ensures efficient gas conversion, and smooth and fail- safe operation. Process control for biogas, natural gas or deep gas methane fuel can be used as alternative configuration.

Standard or customized size

Metacon Hydrogen Production Systems are produced in standard sizes: in three groups: Small systems 1 – 5 Nm³/h, Medium systems 10 – 80 Nm²/h and Large systems 100 – 1000 Nm³/h. Custom design and sizing can be specified according to customer needs

Custom designed total energy system solutions

Metacon HyBio hydrogen systems can be supplied with optional system for adoption to the locally available biological energy matter or biogas, and also to the customer need for various forms of energy. Examples are methane reactors, fuel cells and hydrogen fueling stations. All systems are containerized for quick and easy installation.

ABOUT METACON

Metacon develops and markets energy systems for electrochemical conversion of LPG, biogas and natural gas to hydrogen and clean electricity and heat. Our systems are delivered turn- key with all included and optional systems integrated, for local energy production or for commercial energy supply through external connection. Technology and products are based on proprietary, patented reactor-catalyst configurations for fuel reformation processes.

SPECIFICATIONS:

	unit	data
Rated hydrogen production	Nm ³ /h	10
Operating range	%	50 - 100
Delivered hydrogen pressure	bar	10

Delivered stream gas composition>

- H ₂	% _{vol}	> 99,99
- CO	ppm _{vol}	< 1
- CO ₂	ppm _{vo}	< 10
- CH ₄	ppm _{vo}	< 5
- N ₂	ppm _{vo}	< 10
- H ₂ O	ppm _{vo}	< 1

Utilities consumption, at full load:

- Biogas (CH ₄ > 65%, + 40 °C)	Nm ³ /h	7,8
- Natural gas (CH ₄ 95%, + 40 °C)	Nm ³ /h	4,5
- Electrical power consumption	kW	< 5
- DI water	l/h	12

Operation: Continuous

Dimensions (LxWxH): 1.75 x 1,1 x 2,0 m

Noise Level: <50 dBA @ 1m

TECHNOLOGY:

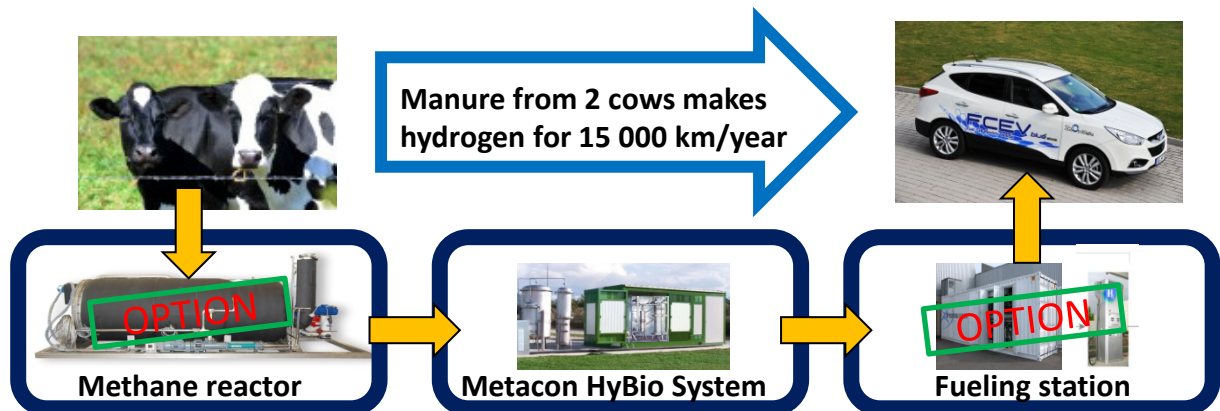
Reformer: Heat integrated steam reforming
CO minimization: Single stage water gas shift

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Data are subject to change

Metacon can offer complete hydrogen fueling station



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